NHDOT SPR2 PROGRAM
RESEARCH PROGRESS REPORT

Project # 26962O		**Report Period** Year: 2016 ☐Q1 (Jan-Mar) ☐Q2 (Apr-Jun) ☐Q3 (Jul-Sep) ☒Q4 (Oct-Dec)
Project Title: Incorporating Impact of Aging on Cracking Performance of Mixtures during Design		
Project Investigator: Jo Sias Daniel and Eshan Dave **Phone:** 603-862-3277		**E-mail:** jo.daniel@unh.edu
Research Start Date: December 1, 2016	**Research End Date:** September 30, 2018	**Project schedule status:** ☒ On schedule ☐ Ahead of schedule ☐ Behind schedule

Brief Project Description:

Presently, the NHDOT relies upon the performance grading of the binder to ensure the appropriate selection of materials to resist cracking in the field. However, recent research presented at various conferences and the FHWA Expert Task Group meetings has shown that the current PAV aging for binders may only represent the condition of in service pavements after 2-3 years. In some cases, this is not adequate to differentiate or screen materials that may age quickly and lead to increased cracking. Also, research has shown the importance of evaluating the mixture properties, to include the effect of aggregate structure and minerology, on cracking performance; this is currently not part of the NHDOT specification.

The results of this project will help NHDOT to improve the selection of asphalt mixtures to resist cracking, resulting in long term cost savings and better ride quality. The experimental study will provide the NHDOT and industry with information on cracking characteristics of mixtures including different percentages of RAP, different binder grades, and different aging conditions

Progress this Quarter (include meetings, installations, equipment purchases, significant progress, etc.):

Only one month of activity has occurred during this quarter. The literature review has begun to gather information on the various laboratory aging protocols that are currently being used. Based on the in initial review, pilot work using several of the Lebanon mixtures has begun to evaluate the impact of three different aging protocols on the measured dynamic modulus and fatigue properties of the mixtures:

- Loose mix aging at 135C for 24hrs (Asphalt Institute protocol)
- Loose mix aging at 95C for 12 days (NCHRP 9-54 protocol for similar climate)
- Loose mix aging at 95C for 6 days (NCHRP 9-54 protocol)

Preliminary results show that the dynamic modulus and phase angle values measured on mixtures subject to the first two aging protocols are statistically similar, and significantly different from values measured on short term aged material.

Items needed from NHDOT (i.e., Concurrence, Sub-contract, Assignments, Samples, Testing, etc…):

Nothing at this time.

Anticipated research next 3 months:

The following activities are planned for the upcoming quarter:

- Meet with the TAG for the project to finalize the aging protocol, testing plan, and selection of mixtures to be evaluated
- Finalize the literature review
- Continue aging and testing of available mixtures
- Provide NHDOT with selected aged mixtures for extraction and recovery of binder for subsequent testing

Circumstances affecting project: Describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope, and budget, along with recommended solutions to those problems.

There was a three month delay in the anticipated start date of the project, but that has not presented any challenges to date as materials were available from the previous project to begin the pilot aging work.

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Tasks (from Work Plan)	Planned % Complete	Actual % Complete
Task 1: Literature Review and Finalize Testing Plan	30%	20%
Task 2: Laboratory Aging of Mixtures	0%	10%
Task 3: Characterization of Extracted and Recovered Binders	0%	0%
Task 4. Mixture Material Characterization Testing and Analysis	0%	5%
Task 5. Development of Screening Tool and Guidelines	0%	0%